

Fertilizer placement and competitive ability of spring barley varieties – Results from two years of organic field trials

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Average annual yields of organic spring barley in Denmark 2008-2012 ranged from 37 to 40 hkg per hectare, whereas yield levels of conventional barley in the same time frame ranged from 46 to 55 hkg per ha (StatBank Denmark, 2014). Organic yield levels are thus significantly lower than conventional yield levels, and competition from weeds is a major cause of yield loss. One of the previously demonstrated management methods, to decrease weed effect on grain yield, is fertilizer placement. Another method is to grow a variety with a high competitive ability towards weeds. To investigate the effects of combining fertilizer placement with crop competition in organically grown spring barley, a two-factor field experiment was conducted at certified organically grown fields in 2012 (3 locations) and 2013 (5 locations). The fertilizer/plant nutrient treatments were 0 kg; 500 kg Biogrow per hectare (Biogrow is an organic fertilizer product based on meat and bone meal, NPK 10-3-1, dosage equivalent to 50 kg N per hectare) broadcast at time of sowing; or placement of 500 kg Biogrow per hectare between the rows of spring barley at 6 cm depth. The second factor was variety, where the variety Simba was chosen as a variety with low competitive ability towards weeds whereas Quench (2012) or Evergreen (in 2013) were chosen as competitive spring barley varieties, these varieties were approximately 6 cm taller than Simba. The experiments were harvested in August when the crop was fully ripe and grain yield recorded. Data from the 8 experimental locations were statistically analyzed by the Nordic Field Trial system.

Results of these experiments showed a significantly higher grain yield per hectare in the competitive variety compared to the variety with lower competitive ability, and the fertilizer placement resulted in a significantly higher grain yield than the broadcasted fertilizer application. Furthermore, fertilizer placement resulted in significantly lower weed coverage at flowering, than broadcasting the fertilizer. A further objective of the study was to investigate if the experiment would reveal an interaction between the two factors. The statistical analysis of grain yields at each experimental location revealed a statistically significant interaction between fertilizer treatment and variety at two locations; however 6 locations showed no significant interaction. A similar pattern was found for weed coverage. The experiment therefore implies that using fertilizer placement and growing a competitive spring barley variety will have mostly additive effect on the expected grain yield per hectare.

References

- StatBank Denmark (2014). www.statistikbanken.dk (accessed 31st January 2014).
- Pedersen JB and Pedersen CA (2013). The National Field Trials (In Danish). The Knowledge Centre for Agriculture, 460 p.

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